



Cambridge International AS & A Level

CANDIDATE
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MARINE SCIENCE

9693/01

Paper 1 AS Structured Questions

October/November 2020

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Blank pages are indicated.

Answer **all** the questions in the spaces provided.

1 Fig. 1.1 shows how a tropical cyclone (hurricane or typhoon) is formed.

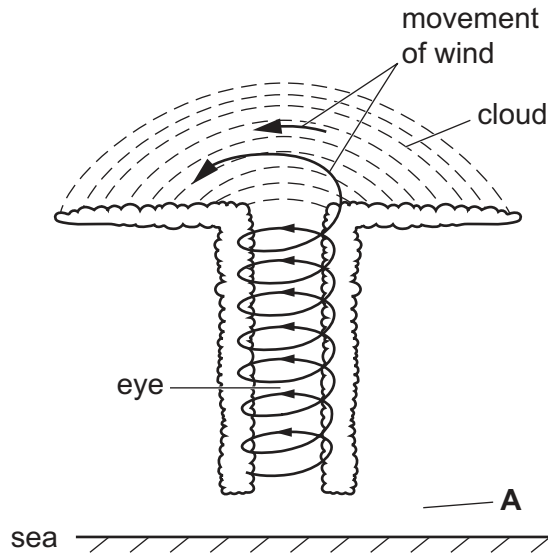


Fig. 1.1

(a) Describe **two** ways in which the conditions at the eye would differ from the conditions at location **A** in Fig. 1.1.

- 1
 -
 - 2
 -
- [2]

(b) Place an **X** on Fig. 1.1 to show where an increase in sea level would occur. [1]

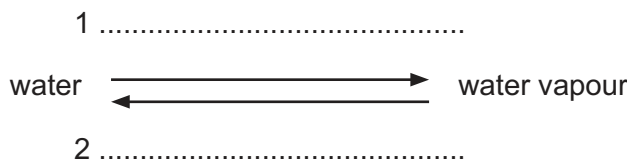
(c) Draw **one** arrow on Fig. 1.1 to show the direction of movement of water vapour through a tropical cyclone. [2]

(d) State **three** factors required for the development of a tropical cyclone.

- 1
- 2
- 3

[3]

(e) There are processes that turn water to water vapour and back to water.
Name these **two** processes.



[2]

[Total: 10]

2 Organisms of different species may live in close relationships with each other. Two such relationships are parasitism and mutualism.

- (a) Scientists investigated parasitism in a species of fish. They recorded the length of 1358 fish, and whether or not they had parasites attached to their bodies.

The results are shown in Table 2.1.

Table 2.1

parasites attached to body?	number of fish	range of length of fish/mm
no	534	80 to 196
yes	824	88 to 220

- (i) Discuss evidence from the table that fish with a longer length are more likely to have parasites attached to their bodies.

.....

.....

.....

.....

.....

.....

..... [3]

- (ii) Suggest why fish with parasites attached are more likely to be caught by predators.

.....

.....

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.....

..... [3]

(b) Zooxanthellae and coral have a mutualistic relationship.

Describe the mutualistic relationship between coral and zooxanthellae.

.....

.....

.....

.....

.....

.....

..... [3]

(c) Fig. 2.1 shows the mean sea surface temperature off the coast of the Cayman Islands between 1982 and 2014.

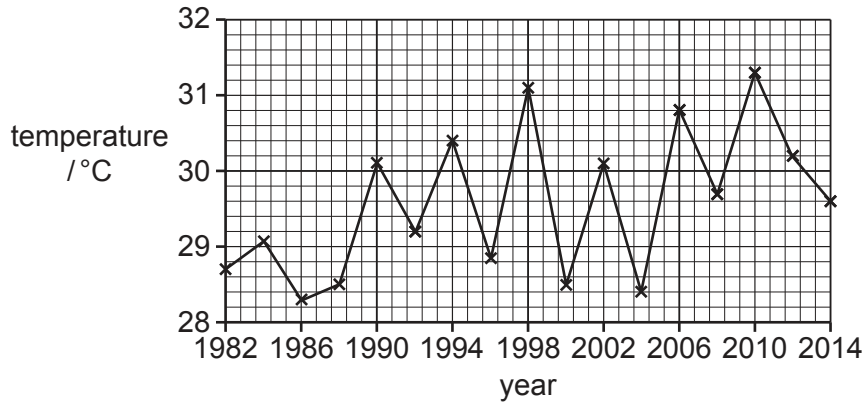


Fig. 2.1

When temperature increases zooxanthellae often leave the coral. This is called coral bleaching.

The temperature at which coral bleaching occurs off the coast of the Cayman Islands is 30.2°C.

(i) State **one** year when coral bleaching is likely to have occurred.

..... [1]

(ii) Describe the patterns shown by the data in Fig. 2.1.

.....

 [3]

(iii) State **two** factors, other than coral bleaching, that can result in erosion of coral reefs.

1
 2 [2]

(d) List **two** methods used to reconstruct the history of a coral reef.

1
 2 [2]

[Total: 17]

[Turn over

3 Fig. 3.1 shows the energy in each trophic level of a marine food chain.

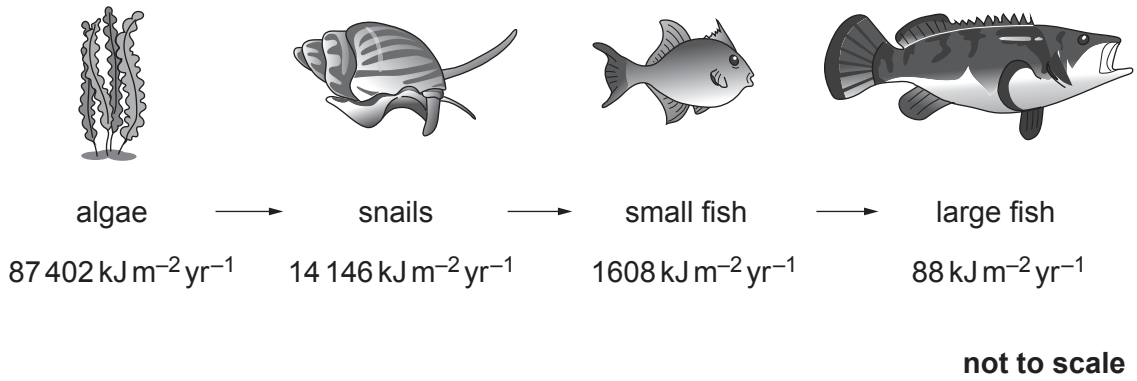


Fig. 3.1

(a) Name the producer in Fig. 3.1.

..... [1]

(b) Name **one** prey organism in Fig. 3.1.

..... [1]

(c) State the trophic level that snails feed at in the food chain in Fig. 3.1.

..... [1]

(d) Energy is lost between the trophic levels of a food chain.

(i) Calculate the loss of energy between the snails and the small fish in Fig. 3.1.

..... $\text{kJ m}^{-2}\text{ yr}^{-1}$ [1]

(ii) State reasons for the loss of energy between the snails and the small fish.

.....

.....

.....

.....

.....

.....

..... [3]

(e) Suggest **and** explain how an increase in the number of daylight hours would affect the energy flow in the food chain.

.....
.....
.....
.....
.....
.....
..... [3]

(f) Some food chains involve chemosynthesis.

(i) Outline the role of chemosynthesis in a food chain.

.....
.....
.....
..... [2]

(ii) State **one** example of a marine organism that uses chemosynthesis.

..... [1]

[Total: 13]

- 4 (a) Fig. 4.1 shows the height of the tide over one month.

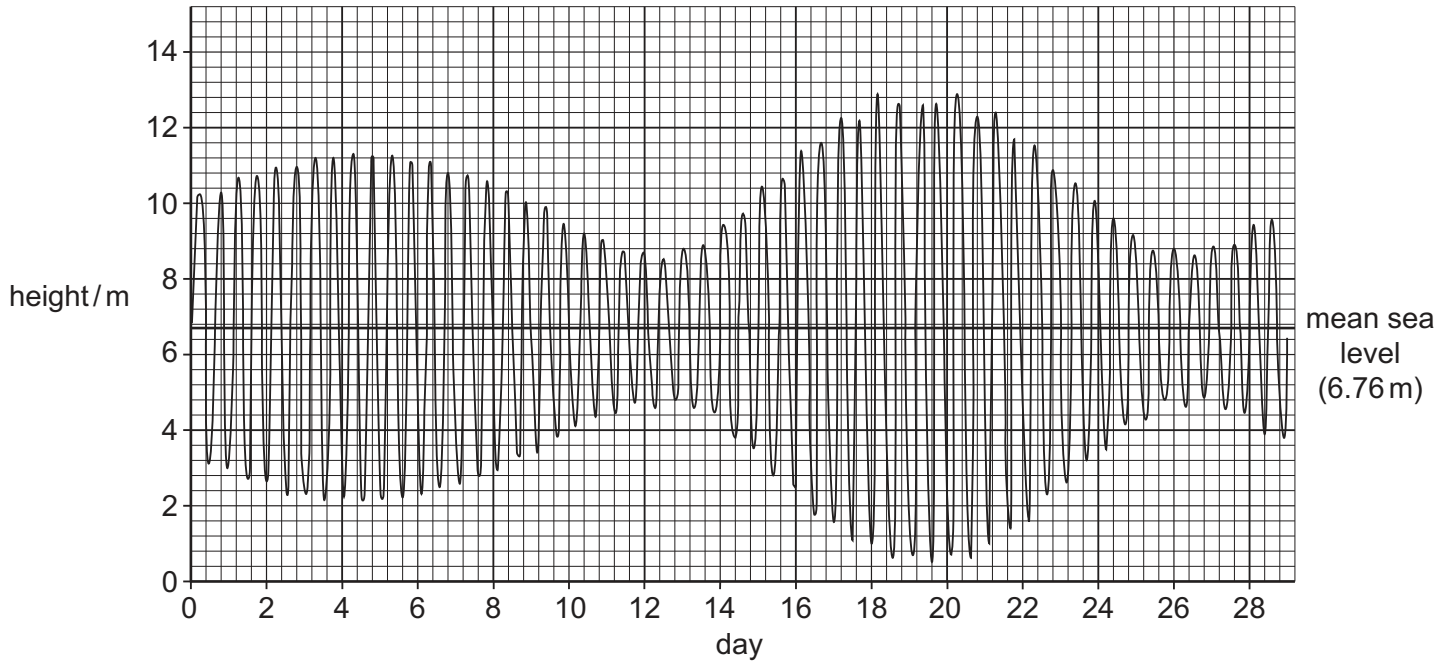


Fig. 4.1

Tidal range is the difference in height between a high tide and the next low tide.

- (i) Calculate the tidal range on day 10 in Fig. 4.1.

..... m [1]

- (ii) State the day on which the tidal range was largest in Fig. 4.1.

..... [1]

- (iii) Estimate the number of tidal cycles between the start of day 0 to the start of day 4 in Fig. 4.1.

..... [1]

(b) Fig. 4.2 is a representation of the positions of the Earth, Moon and Sun at one stage of the tidal cycle.

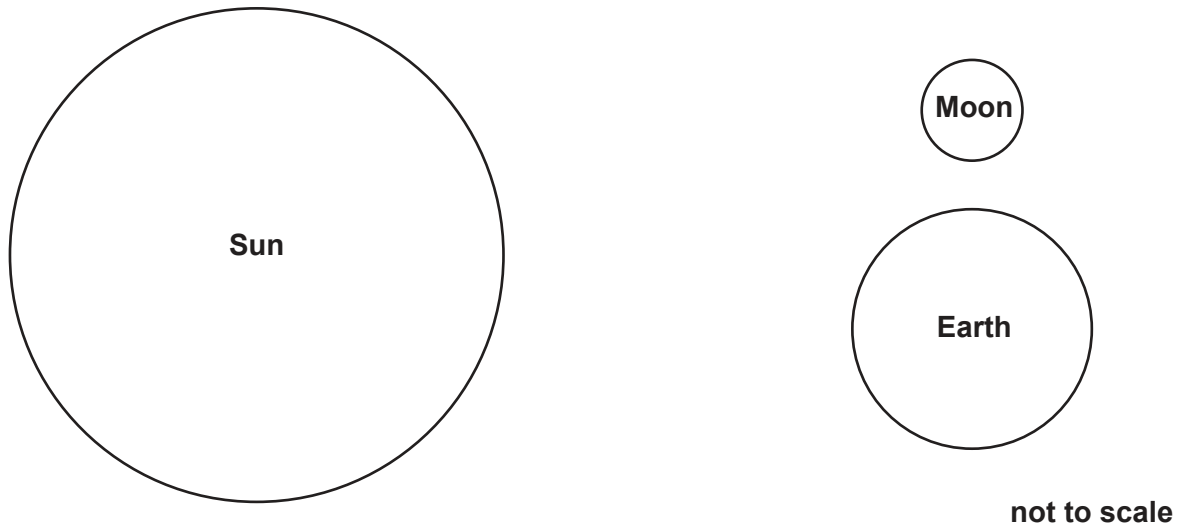


Fig. 4.2

(i) Describe the tide caused by the alignment shown in Fig. 4.2.

.....
..... [1]

(ii) State **two** factors, other than the alignment of the Earth, Moon and Sun, that affect tidal range.

1

2 [2]

[Total: 6]

5 Fig. 5.1 is a photograph showing a rocky shoreline.



Fig. 5.1

(a) Explain how the processes of erosion **and** sedimentation give rise to **rocky shores**.

.....
.....
.....
..... [2]

(b) Explain how the processes of erosion **and** sedimentation give rise to **deltas**.

.....
.....
.....
..... [2]

(c) Explain how exposure to air **and** wave action influence ecological communities found on a **rocky shore**.

exposure to air

.....

.....

.....

wave action

.....

.....

.....

[4]

[Total: 8]

(b) Salinity also changes with depth in the ocean.

(i) Describe how salinity gradients are formed.

.....

.....

.....

.....

.....

..... [3]

(ii) Salinity of surface water varies in different areas of the Atlantic Ocean.

Fig. 6.2 shows an area where surface salinity is relatively high.

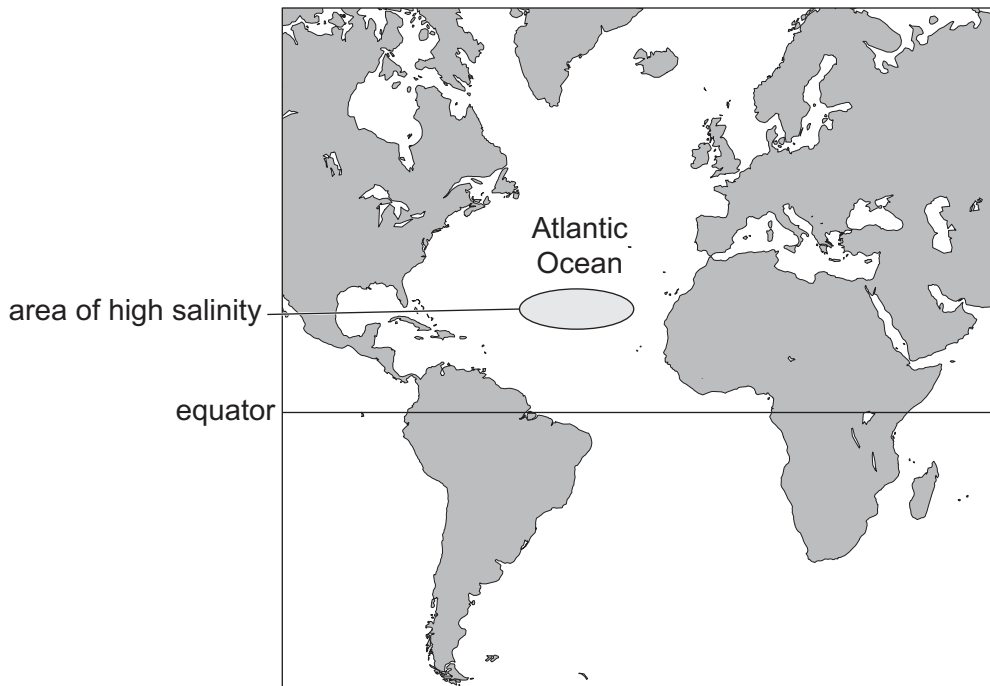


Fig. 6.2

Suggest why surface salinity shown in the area in Fig. 6.2 is relatively high.

.....

.....

.....

.....

.....

..... [3]

[Total: 13]

[Turn over

7 Fig. 7.1 is a diagram summarising the marine phosphorus cycle.

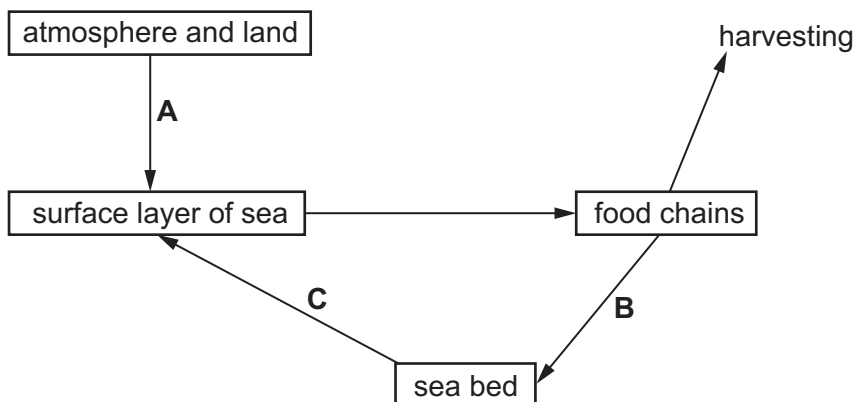


Fig. 7.1

(a) There is very little phosphorus present in the atmosphere.

(i) Suggest how phosphorus enters the ocean at **A**.

..... [1]

(ii) State the process occurring at **C**.

..... [1]

(iii) Suggest how a lack of phosphorus in the ocean may affect the populations of marine fish.

.....

 [3]

(b) Describe the processes represented by the letter **B** in Fig. 7.1.

.....

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..... [3]

[Total: 8]

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